



# Technical Review

<b>To:</b>	Shay McDonald	<b>Date:</b>	20 March, 2026
<b>Authority:</b>	Otago Regional Council	<b>Ref:</b>	25080A3.0
<b>Consent:</b>	Fast-Track Bendigo Ophir Mine		
<b>From</b>	<b>Role in Audit</b>		
Alexandra Badenhop	Surface water modelling, Groundwater & Geochemistry		

## 1 Project Summary

### 1.1 Scope

Matakanui Gold Limited (the applicant) is seeking fast-track approval for the Bendigo-Ophir Gold Project. The Otago Regional Council (ORC) has asked me to undertake a technical review of the groundwater, geochemistry and surface water modelling components of their substantive application.

My initial review (16<sup>th</sup> December, 2025) included reference to the following documents, which are referred to by the numbering code in bold throughout this report:

- **B.02:** Rekker, J.H. (2025). Bendigo–Ophir Gold Mine Project – Bendigo Groundwater Bore Take Effects Assessment, Kōmanawa Solutions (KSL) Report No. Z24019SML-3 prepared by KSL for Matakanui Gold Ltd, Christchurch. 73 pp, including appendices.
- **B.03:** Rekker, J. H., & Dumont, M. (2025). Bendigo – Ophir Gold Mine Project – Groundwater Existing Environment & Effects. Assessment. Kōmanawa Solutions Client Report No. Z24002BOG-1. Kōmanawa Solutions Ltd, Christchurch.
- **B.04:** Rekker, J. (2025). Bendigo – Ophir Gold Mine Project – Surface Water & Catchment Existing Environment & Effects Assessment, (Report Series No. Z24002BOG-2). Kōmanawa Solutions Ltd, Christchurch.

- **B.05:** Dumont et al., (2025). Groundwater Modelling Analysis for Mining Bendigo Ophir Gold Deposit. Report: Z24002.m1.1 prepared by Kōmanawa Solutions Ltd for Matakanui Gold Ltd.
- **B.06:** Mine Waste Management Limited (2025)- Mine Impacted Water Overview Report. J-NZ0488-001-R-Rev0 11 October 2025
- **B.06A:** Mine Waste Management Limited - Mine Impacted Water Overview Report - Appendix B to G.pdf
- **B.06B:** Mine Waste Management Limited - Mine Impacted Water Overview Report - Appendix H.pdf
- **B.06C:** Mine Waste Management Limited - Mine Impacted Water Overview Report - Appendix I to O.pdf
- **B.07:** Ryder. G (2025). BENDIGO-OPHIR GOLD PROJECT Recommended water quality compliance limits for the Bendigo-Ophir Gold Project, Prepared for Matakanui Gold Limited by Greg Ryder Consulting Draft version: 4.2 (Final) Date: 30 July 2025.
- **B.42:** Burgess, R. (2025). BOGP Wetland Drawdown Assessment. HydroGeochemGroup Memorandum. 10 October 2025. J-H-NZ0235-001-M-Rev0
- **B.43:** Burgess, R. (2025). BOGP Flow Augmentation Strategy. HydroGeochemGroup Memorandum. 20 October 2025. J-H-NZ0235-002-M-Rev0.
- **D.02** – Otago Regional Council Resource Consents and Conditions
- **D.04** – Schedule Two – General Conditions for Otago Regional Council Resource Consents
- **G.01:** Water Management Plan. Matakanui Ltd. Prepared by Mine Waste Management Ltd. 23/10/2025.
- **G.15:** Engineered Landform Management Plan

Responses to initial requests for further information were received in the following documents:

- Rekker (2026). “Memo: Responses to ORC Technical Review in terms of the Fast-Track Approvals Act and RMA”. 30 January 2026. Kōmanawa Solutions Ltd, Christchurch
- MWM (2026). “Otago Regional Council Clarifications”. 30 January, 2026. J-NZ0488-003-L-Rev0
- Dumont and Rekker, (2025). *Post Closure Impacts of Bendigo Ophir Gold Deposit on the Ardgour Aquifer*. Report: Z24002.m2 prepared by Kōmanawa Solutions Ltd for Matakanui Gold Ltd..

In response to the further information provided, I have reviewed the following documents for information relevant to groundwater, geochemistry and surface water modelling. Note that flood hazard and geotechnical stability are outside of my scope.

**B.21** – EGL (2025b). E Matakanui Gold Limited. Bendigo-Ophir Project - Shepherds Tailings Storage Facility Technical Report

**B.22** – EGL (2025c). Matakanui Gold Limited Bendigo-Ophir Gold Project Site Geotechnical Factual Report\_Part 1, 2 & 3

**B.23** – EGL (2025d). Matakanui Gold Limited Bendigo-Ophir Gold Project Shepherds Silt Pond Technical Report. 8 August 2025

**B.24** – EGL (2025e). Matakanui Gold Limited Bendigo-Ophir Gold Project Rise And Shine Pit - Creek Diversion Technical Report. 8 August 2025

**B.25** - EGL (2025f). Engineering Geology Limited - Process Plant, Infrastructure and Admin Areas Geotechnical Report

**B.27** - EGL (2025h). Engineering Geology Limited -Shepherds, Western and Srex ELFs, and CIT Pit Backfill Technical Report (EGL 2025h)

**B.28** - Peter O'Bryan & Associates (2025) - Geotechnical Assessment Open Pit & Underground Mining - RAS Deposit (POB 2025)

**G.20** – MGL (2025). Matakanui Gold Limited Soil Management Plan. 8 September 2025

I attended the Water Workshop with ORC and the applicant's water experts on 24-25<sup>th</sup> February, 2026.

As a result of this workshop, I am expecting the applicant to address and action the points summarised in their summary document "260224 Notes from WATER Workshop Day 1 & 2.doc". The following document was supplied as an output of the workshop:

**HGG (2026)**. BOGP MWSF Seepage Risk Assessment. 5 March 2026.

Two further memos were supplied on 19<sup>th</sup> March, 2026:

- Rekker (2026a). Memo Instituting an Alluvium – Weathered Rock Depth Drillhole Fence at SC-01 Monitoring Site. 11 March 2026
- Rekker (2026b). Instituting Water Quality Monitoring of Lindis River and Bendigo Creek. 11 March 2026
- MGL (2026). Water workshop tasks.

This assessment has been updated in response to all of the additional information provided and based on discussions at the Water Workshop.

## 1.2 Descriptions of existing environment

The description of the existing environment is adequate in terms of surface water flows and quality, however groundwater connectivity, transport and wetland hydrology is lacking.

**Table 1: Data Available for Descriptions of Existing Environment**

<b>Parameter</b>	<b>Data Collected</b>	<b>Issues</b>	<b>Significance/Comment</b>
<b>Surface Water Flow</b>	Flow data at SC01, SC03, JC1, RS01, RS02 ~ 2 years	RS03 is to be the compliance point – currently no flow data at this location	Flow gauging is intended at RS03
<b>Surface Water Quality</b>	Baseline water quality collected over 2 years	-	I understand data is also to be collected at RS03
<b>Rainfall</b>	Local data collected in 3 locations on site and correlated with other sites	-	
<b>Groundwater Level</b>	4 measurements rounds in pit locations – holes drilled to resource. Vibrating wire piezometers installed at three depths in 3 holes at the location of TSF embankment, 2 lower in Shepherds Ck, and 2 in the upper RAS catchment	-	Important for understanding flow directions
<b>Groundwater quality</b>	Data collected from 3 artesian wells terminated in the RSSZ within proposed pit areas.	No water quality data collected within the veneer aquifer around proposed mine waste storage facilities (ELFs and TSF)	Important for understanding baseline conditions.
<b>Aquifer parameters</b>	Packer tests in RAS pit location at a range of depths to determine hydraulic conductivity	No measurements in veneer aquifer No measurements of storage values. No measurements in the shallower more weathered TZ-3.	Uncertainty in the extent of drawdown and hence stream/wetland impacts.
<b>Geochemical hazards</b>	Acid base accounting, elemental composition analysis, SPLP and shake flask extraction, column leach testing	-	Required to understand the risks to water quality from the project.

No investigations have been completed within the Ardgour aquifer. Testing has been completed within the production well in the Bendigo aquifer to determine storage and conductivity values and one water quality test completed.

The details of further investigations (test pits and groundwater levels measured in vibrating wire piezometers) were provided in B22. EGL – Site Geotechnical Factual Report, with some summaries in MWM (2026). No groundwater quality data has been collected in the veneer aquifer, nor have monitoring wells been installed.

Data for the Ardgour Aquifer is quite limited, and a clear understanding of the interaction between Shepherds Creek, the Ardgour Aquifer and the Lindis River Alluvial Aquifer is lacking.

The hydrology of wetlands across the site has not been well described to understand their catchments and dynamics of their loss, however drive point piezometers are to be installed to monitor the wetlands within the Rise and Shine Creek catchment.

## 2 Groundwater Take, Bendigo Aquifer

Consent is sought for a take of 110L/s from the Bendigo Aquifer, 6.5 km west of the proposed gold mining site for process water and dust suppression.

**Table 2: Proposed Groundwater Take Rates**

	<b>Rate of Take</b>	<b>Average Rate (L/s)</b>
<b>Max (L/s)</b>	120	120
<b>Daily (m<sup>3</sup>/day)</b>	10,368	120
<b>Monthly (m<sup>3</sup>/month)</b>	285,120	110
<b>Annual volume (m<sup>3</sup>/year)</b>	3,153,600	100

The aquifer test parameters determined by pumping test analysis of  $T = 4500 \text{ m}^2/\text{day}$  and  $S_y = 0.25$  are reasonable. However, it should be noted that constant rate test did not meet the ORC minimum aquifer test requirements<sup>i</sup> as it should have been pumped for 72 hours at the highest required rate with two observation bores. The test was only completed for 48 hours at ~21 L/s with one observation bore.

The assessment of impacts on groundwater users accounts for the available freeboard within each bore, the drawdown within the bore, and the natural water level fluctuation as measured in ORC's water level monitoring bore. Pumping will not induce drawdown from neighbouring creeks (Chinamans/School) and Bendigo Creek as they are perched ~ 20 m above the aquifer and are known to

<sup>i</sup> <https://www.orc.govt.nz/media/14441/aquifer-test-guidelines.pdf>

dry out as they exit the mountains and cross the alluvium. Stream depletion of the Clutha River would be likely 70 L/s (64% of the take) after 365 days. Assessment of the impact of ceasing pumping due to minimum flow restrictions indicated that the lag in drawdown effects would be such that it would provide little benefit (this is a consideration due to conditions imposed to ensure available water for Contact Energy). The requested take is within available allocation limits for the Bendigo Aquifer and Clutha Mata-au River. The only wetlands that could be affected are the riparian wetlands within the Clutha River Mata-au floodplain, however due to the large flows within the river, no effects are expected

### 2.1.1 Uncertainty

The impact of the barrier boundaries to the west and south-west were not accounted for within the drawdown assessment, nor the cumulative effects of drawdown' from consented takes from neighbouring bores.

Rekker (2026) has stated the applicants intent to conduct a commissioning aquifer test that would provide better information to complete a cumulative drawdown assessment. If the drawdown assessment indicated that groundwater users would be affected by drawdown induced by MGL's proposed take, MGL would offer remedial actions to the affected bore owner to minimise, offset or compensate for any reduced access to groundwater. It is proposed that this would be included in the Water Management Plan. These requirements are suitable to be included in conditions for the consent, rather than in the WMP.

No justification has been provided for the volume of water requested in terms of

### 2.1.2 Monitoring

Monitoring is proposed for the following –

1. Groundwater level at
  - BOGMP bore field monitoring bore (CB13/0216)
  - Additional neighbouring bore (potentially G41/0263)
  - ORC SOE monitoring bore CB13/0159
2. Groundwater pumping Rate and Volume at BOGMP bore field production bore (CB13/0215)
3. Groundwater water quality at BOGMP bore field production bore (CB13/0215) and one other.

This monitoring is likely to be adequate, but this should be confirmed after the proposed commissioning test.

### 3 Groundwater Quantity

#### 3.1 Groundwater Modelling

Models for each mining pit were conducted independently and have different calibrations for the three main layers of hard rock aquifer (RSSZ, TZ-3 schist and TZ-4 schist). The thin unconfined veneer aquifer was not explicitly modelled. This modelling was completed to understand the pit dewatering requirements and the likely effects on the streams.

Initial modelling did not include the impact of dewatering the underground RAS. A further simplified model was completed in response to the request for further information (MWM, 2026) that provided evidence that the RAS would not impact on stream depletion (assuming integrity of the overlying rock mass).

##### 3.1.1 Boundary conditions

1. Constant head cells along the creeks to simulate generalised discharge to surface water features either directly or via the veneer aquifer. The use of constant head cells also allows for scenario models to predict potential inflows from the creeks (via the veneer aquifer) to the hard rock aquifer should the pit de-watering induce drawdown. This uses the MODFLOW CHD package.
2. Distributed recharge across the land surface to simulate the generalised inflows from the veneer aquifer to the hard rock aquifer. This uses the MODFLOW RCH package.
3. Drain cells across the model to simulate the potential discharge from the hard rock aquifer to the veneer aquifer. This uses the MODFLOW DRN package. Note in places most or all of the recharge applied to a model cell may be immediately discharged to the drain package. This occurrence suggests no recharge from the veneer aquifer to the hard rock aquifer in these locations. These cells also prevent unrealistically high groundwater levels caused by refused recharge, where, numerically, the model is forced to uptake the prescribed recharge, but in reality the recharge would be refused and the water would remain in the veneer aquifer.

4. Drain cells to simulate the discharge to the pit. This uses the MODFLOW DRN package. When the pit excavation is included in the model, an additional discharge pathway is created from the hard rock aquifer to the pit. The impacts of this excavation may be: reductions in discharges to the creeks, as well as reduction in discharges to the veneer aquifer, or increases in recharge from the veneer aquifer. The dewatering of the pit is simulated by creating additional drain cells throughout the excavated area, with a very high conductance relative to the model conductivity ( $10^3 \text{ m}^2/\text{day}$ ).

### 3.1.2 Calibration

Each of the models underestimates head in vicinity of pit, and overestimates in areas of discharge. Rekker (2026) indicates that this is likely due to the difference in recharge between the steeper valley sides and flatter ridge tops. The Come in Time and Rise & Shine models were calibrated to different hydraulic conductivities, and calibration of head levels around the Come in Time Pit could not be achieved in the broader RAS model. Further information provided in Rekker (2026) clarified that the anticipated stream depletion was as a result of reduced catchment area rather than groundwater pumping.

### 3.1.3 Uncertainty

Groundwater modelling was completed in steady state and therefore dewatering requirements at the beginning of the models may be higher than predicted, which may impact on the site water balance. Groundwater depressurisation is essential to maintain stability within the pit (**B28**. POB, 2025). Groundwater modelling allows the pit to drain in accordance with the pit dimensions, however, it is unclear whether this provides for the extent of depressurisation required for pit stability. During the Water Workshop, this was discussed with Mr Rekker who indicated that this volume is generally a small volume of storage.

The potential for underground mining and pit mining to cause fracturing was discussed and the risk was considered to be low by EGL due to paste backfilling.

## 3.2 Impacts on Wetlands

Empirical calculations were completed to assess the drawdown caused by pumping and the likely impacts on wetlands (Appendix B.42: Burgess, R. (2025)). They indicate that drawdown may affect all of the surrounding wetlands, and the recommendations are to:

- Mitigate drawdown on the swamp and marsh wetlands within the Rise and Shine Creek valley by augmenting creek flows using groundwater from the Bendigo Aquifer take. Monitoring of groundwater levels using drive point piezometers was confirmed during the water Workshop
- Establish performance monitoring of groundwater levels adjacent to the hillslope seepage and gully fen wetlands to determine whether drawdown will impact these wetlands. This was discussed but the strategy was not confirmed.
- Complete further investigations to understand the hydrological functioning of the wetlands, and create trigger action response plans should performance monitoring indicate impacts.

Note that the increase of base flows post mining may also impact on wetland hydrological functioning.

## 4 Water Quality

### 4.1 Baseline Water Quality Investigations

Baseline water quality investigations are outlined in MWM (2025 Appendix D). Data was collected between September 2022 to November 2024. The assessment found that Shepherds Creek is elevated in copper (Cu), Bendigo Creek is elevated in arsenic (As), cobalt (Co), Cu, and iron (Fe), and groundwater is elevated in As, Cu, Fe, zinc (Zn), and on occasion strontium (Sr) within the project area. The report acknowledges that additional monitoring data is required to ensure at least 2 years of baseline data in line with ANZG, (2018) recommendations for site-specific guidelines.

Only three bores were sampled that in the location of the proposed RAS and SREX pits that are assumed to be terminated within the RSSZ, and two of the bores were flowing artesian wells. The baseline groundwater data collected will be useful for understanding the dewatering water quality, but not the receptors - no investigations were completed within the groundwater veneer aquifer within the valleys, nor within the Ardgour aquifer. One sample was taken within the Bendigo aquifer from the pumping bore.

### 4.2 Geochemical Hazard Investigations

Water quality risks were identified by:

- Sampling and elemental composition analysis of drill core from proposed pit locations (n=349) + XRF analysis (n=853) which identified that sulphate, arsenic, iron, antimony, aluminium, cobalt, copper, chromium and zinc should be monitored as potential contaminants of concern. Waste rock from the RSSZ is likely to exceed 100 ppm arsenic and half of the waste rock samples could exceed 1000 ppm arsenic, with 3% of samples exceeding 10000 ppm, and hence tailings are also expected to be high in arsenic.

**Table 3: Elemental composition of Waste Rock**

	% of Waste Rock	PCOC	Arsenic % waste rock load	Sulfur % waste rock load
<b>TZ3</b>	88.7	<b>As, Co, (Sb?)</b>	4.7	78.1
<b>RSSZ &amp; TZ4</b>	9.3	<b>As, S, Sb (?), Al, Cr, Zn</b>	95.3	21.9
<b>Soils</b>	2.1	Al, As, Co, Cu, Fe, Zn		

- Acid base accounting (n=388) demonstrated that the materials across the site can be classified as Non Acid Forming.
- SPLP leachate analysis (9 samples only from TZ4 and RSSZ, 5 samples from soils) and SPLP testing confirmed that compliance monitoring should be required for aluminium, arsenic, cobalt and copper, iron, chromium and zinc as potential contaminants of concern (Appendix F). Additional SPLP testing was completed on drill core from the proposed RAS pit (TZ3 n = 4, TZ4/RSSZ n=3), and shake flask extraction completed on historic waste rock, and weathered TZ4 from a road cutting (n=3). Due to being slightly elevated in additional testing, performance monitoring should include cadmium and vanadium (Appendix G). The SPLP tests indicated a relationship between the concentration of sulfur and arsenic, and sulfur and antimony. Testing indicated that more sulfate is generated from the TZ3 materials than the TZ4/RSSZ samples, independent of oxidation processes which represents a large source of sulfate (Appendix G).
- Scanning electron microscope analysis to determine sulfur speciation of drill core, historic waste rock, and weathered TZ4 from a road cutting. Oxidation of sulfide minerals identified by SEM could lead to the release of PCOC that include sulfate (SO<sub>4</sub>), As, iron (Fe), and trace metals that include Co, Cu, lead (Pb), and zinc (Zn). However, Pb is not identified as being elevated in the SPLP test.
- Twelve month column leach tests (Appendix H) on TZ3 (n=3), TZ4/RSSZ (n=3), historic mining (n=2 from historic waste rock) and TZ4 surface materials (n=1 from road cutting), and tailings (n=1). Drill core was from the RAS pit only.

These identified elevated concentrations of AL, As, Co, Cu, Fe, Sb and Zn, with performance monitoring required for boron, chromium, molybdenum, selenium and vanadium. Ammoniacal nitrogen and nitrate nitrogen were also elevated in historic material, however this was considered to not be applicable to unweathered waste rock. Of note, concentrations of arsenic in the leachate increased over time and stabilised but did not decline. The data was analysed to determine whether metal concentrations had meaningful relationships with sulphate. The data was separated into TZ3 and TZ4 strata. The data showed the following relationships summarised in Table 1, provided as Appendix D to Appendix H.

**Table 4: Parameters with relationships to Sulphate based on CLT tests**

Parameter	TZ3	TZ4
EC	✓	✓
Alkalinity	✓	
Al		
As		✓
B	✓	
Ca		✓
Cl		
Co		
Cr		
Cu	✓	
F		
Fe		
K		
Mg		✓
Mn		
Mo	✓	
NH <sub>3</sub> -N		
Na	✓	
Ni	✓	
NO <sub>3</sub> -N		
Sb		
Se	✓	
Sr		
Zn		
U		
V		

Based on the investigations, MWM recommended that the following PCOC should be included in resource consent monitoring conditions:

- SO<sub>4</sub> – due to elevated sulfur in waste rock and ore.
- As and Fe – due to the presence of As- and Fe- bearing sulfide minerals.
- Sb – due to its relationship with As and sulfur minerals and may be elevated.
- Metals – Al, Co, Cu, Cr, and Zn.

Water quality monitoring also includes pH, cadmium (Cd), manganese (Mn), selenium (Se), and uranium (U) as a more comprehensive dataset to ensure all potential risks are monitored. In addition to these geochemical hazards, elevated TSS and Nitrogen will need to be monitored and managed from mine operations.

### 4.3 Water Balance

The water balance model uses a range of runoff coefficients, and recession coefficients that have not been well justified. It would be helpful to understand if this runoff model preserves the overall water balance of the flows. Within the model, all seepage from mine waste storage facilities (ELF and TSF) is assumed to be captured. There is therefore no modelling or assumption of a groundwater contaminant plume. Whilst the majority of the load is expected to be captured from these pathways, it is possible that migration may occur from pit lakes and through deeper rock pathways. Permanent alteration of the water table will occur as a result of the mine plan. Modelling may identify optimal locations for monitoring and may assist in the detailed design of seepage collection, and has been proposed as a consent condition by the applicant (see Section 7.1).

#### 4.3.1 Source Terms

Source terms (B.06c Appendix I) have been derived for the water balance model based on analogue data from Macraes. The main issue with these source terms are as follows:

- The source terms for the RAS underground workings have been derived using a combination of Lower Bendigo Adit, Golden Point adit (Macraes) and column leach tests (see Section 4.2 but used maximum As for operational phase. In closure phase is assumed to be dominated by pit lake water quality, however this doesn't consider impact of tailings paste on water quality, or demonstrate the relative volumes that the pit and underground workings will contribute.
- Only one water quality sample was available for the process water quality.
- It has been confirmed that mine impacted waters will not be used for dust suppression. At the Water workshop we discussed the need for performance limits that provide a cutoff for using the pit water for dust suppression. This is still to be confirmed. The source term for surficial mine impacted water quality was sourced from 95<sup>th</sup> percentile Frasers Pit sump wall water quality prior to 2011, which was then allowed to equilibrate using PHREEQC geochemical model which indicated precipitation of arsenic, copper, aluminium, iron and lead would greatly decrease the

concentrations of these parameters. This relies on there being high concentrations of iron in the pit wall runoff. In addition, given the high quantities of arsenic indicated within soils, the risk of mobilising higher arsenic loads is not insignificant. The soil management plan requires additional testing of soils that are to be disturbed to ensure that that arsenic impacted soils are appropriately managed.

#### 4.3.2 Modelling of Engineered Landforms

Engineered Landforms (Appendix L) are expected to have the biggest impact on water quality. Key points:

- The modelling is predicated on oxygen being reduced to 5% 20 m into the ELF.
- The lag to peak concentrations was estimated using the analogue from Macraes scaled by the relative waste rock heights.
- Assumes relationship between WRS height and sulfate as for Macraes. Concentration of sulphate remains constant regardless of flow.
- The modelling uses a net percolation rate of 20% which at the lower end of the values predicted in the net percolation report (Appendix K). This is very significant as it has the largest effect on contaminant mobilisation.
- Assumes that only 10% the stored sulfides is available for reaction - this seems very low compared to the literature provided. A further adjustment factor (0.8575) was applied to compare results to Macraes.
- High nitrate-N may occur for 50 years, with double the concentration of Macraes, as Shepherds ELF will be double the size of the Macraes WRS. This could be an initial nitrogen load of 16.6 mg/kg.
- CIT backfill modelling assumes that no oxidation of waste rock occurs when covered in groundwater, however given the higher surface area of the waste rock and oxygen present in groundwater, this may not be a valid assumption. Outflows are expected to present as spring flow from the filled rim of the pit which is to be collected and treated.
- Geochemical modelling using PHREEQC assumes unlimited oxygen such that iron hydroxides can precipitate, and hence other metals co-precipitate, but at the same time arsenic and iron has been assumed to be present in the seepage water as an acknowledgement that the seepage water is unlikely to be fully oxic. This recognises that there is considerable uncertainty in conditions
- The study indicates that even with only 10-20 m oxidation zones, arsenic and iron, nitrate-N, Co, Mo, Mn, Se, Sb, Sr, U and Zn concentrations will

exceed the proposed water quality compliance limits, and therefore seepage water will need treatment prior to discharge.

Whilst most of these assumptions are reasonable (unless stated otherwise), each assumption contributes to uncertainty regarding the ultimate volumes and quality of water that will need to be treated in the future. Oxygen ingress, water quality and flow monitoring of the seepage is vital to compare actual conditions to assumed and modelled source terms, and the model should be updated where significant differences occur, as these factors will influence the duration of the mine water deficit and the quality of water that will need to be treated by the water treatment plant.

#### 4.3.3 TSF Seepage

Prediction of seepage from TSF (**B21**) does not include creek diversions back on to TSF surface or creation of wetland. It compares the volumes with Macraes by relative to the catchment sizes, however removing diversions will increase catchment to ~650 ha (not 156 ha). It may be then that the TSF seepage continues to be higher than anticipated by these calculations. This was discussed during the Water Workshop – ELG considered this is not an issue as it will be captured regardless and the treatment will be designed to treat the actual volumes measured during operations. TSF seepage capture assumed to fail over time and report to the toe of the Shepherds ELF.

#### 4.3.4 Water Balance – Operational

Water balance calculations suggest that the site will be in a water deficit condition up to Year 8 (MWM B.06C Appendix N). The summary of the water balance calculations provided in KSL (Table 19, B.04) indicate that the site would only be in water deficit if some of the water make is used for dust suppression, however water quality load modelling relies on bore water being used for dust suppression to maintain water quality below compliance limits. It has been confirmed that pit water will only be used for dust suppression within the pit or if it meets performance limits that are yet to be confirmed.

After this point, dewatering from satellite pits (i.e., SRX and to a lesser extent CIT) may push the site to a water surplus condition for the last few years of mine life without additional controls. Engineering controls (e.g., construct the water treatment plant prior to closure, evaporative cannons, and additional onsite storage of MIW) are expected to be available to manage potential water

surpluses, and can be evaluated during detailed design phases. Ongoing site water balance reconciliation for the BOGP will be required to confirm water balance conditions remain in a water deficit condition.

- Based on mine features that will retain water on site and not be discharged to the receiving environment during operations, mean flows at SC01 and RS03 are estimated to be reduced by approximately 17% and 13% respectively, at the full life of mine project footprint. Low flow conditions will also decrease, showing the seven day mean annual low flow decreasing by approximately 27% and 15%, for SC01 and RS03 respectively.
- Interpretation of the mixing model results suggests surface water quality at SC01 and RS03 will remain below the proposed compliance limits for both surface and groundwater during the operational stage if groundwater is used for dust suppression.

The water balance requires net percolation into mine waste storage facilities (ELF and TSF) to be no more than 20%, and also for the RAS underground workings inflows stated in KSL (B.03) of 30 L/s to be wrong – MWM used the value of 4 L/s in the WBM. In addition, KSL recommend multiplying the peak inflows by a safety factor of 2, however this has not been considered in the WBM. During the operational phase, net percolation rates are likely to be much higher (60-80%). MWM did model a High Case which used higher rates of infiltration for the ELFs, with annual average rainfall and evapotranspiration. The higher case resulted in a water surplus of ~1 million m<sup>3</sup> in year 12. The rainfall water inputs into the CIT and SREX pits are assumed to be of sufficient water quality to reuse on site. The modelling uses only annual averages of rainfall and evaporation. MWM recommend additional modelling; *“Back-to-back wet years and changes of water balance assumptions (e.g., dust suppression water sources) may move the site into a water surplus condition. As such, detailed water balance modelling by mine stage and that includes rainfall variability is recommended to support detailed mine design and improve confidence in a water deficit being maintained. Development of an adaptive management process related to the site water balance would also support proactive management of identified risks.”*

#### 4.3.5 Water Balance - Post Closure

Outflow from RAS pit through the mine underground workings is modelled using groundwater flow equations. It was confirmed that the portal would remain open and seepage would flow across the ground towards the Shepherds Creek,

though no detail has been provided as to how this would be anticipated to reach the new diversion channel.

#### 4.4 Water Treatment

Water treatment recommendations require the site to be maintained in water deficit for first 8 years of operation. Model results suggest that active water treatment *“within the Shepherds Creek catchment will be needed for 50 years, when concentrations of SO<sub>4</sub>, Mo, and Sb after passive treatment are below the surface water and groundwater limits, for the base case model scenario....For the Rise and Shine catchment, compliance limits at RS03 can be met after partial passive treatment of the average flow (8 L/s) SRX Pit, and without active treatment of MIW from SRX Pit and SRX ELF. ”*

The following PCOC may require treatment by the WTP and PTS to achieve the proposed water quality limits for the BOGP (Ryder, 2025):

- Nitrogenous compounds that include nitrate (NO<sub>3</sub>) and ammoniacal-N (Amm-N) due to the use of explosives and cyanide.
- Sulfate (SO<sub>4</sub>).
- Metals and metalloids that may include Al, As, Cd, Co, Cu, Cr, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sr, and Zn
- Cyanide (CN) within the tailings water

Given that stricter water quality compliance limits may be required to maintain water that is acceptable for drinking and irrigation, the viability of water treatment needs to be confirmed.

#### 4.5 Impacts on the Ardgour Alluvial Aquifer

The impact of the infiltration of Shepherd's Creek water to the Ardgour aquifer was modelled using limited data that could not be calibrated. The model indicated that limited dilution may occur across the aquifer prior to it joining the Lindis Alluvial Ribbon Aquifer, and that this could impact on existing bores.

The summary states water infiltrating from Shepherd's Creek into the aquifer may not be subjected to significant mixing and therefore may not be diluted. The map of potential dilutions provided (Figure 20 in B.03) also indicates that minimal dilution may occur in the Lindis Alluvial Ribbon Aquifer. Given that this aquifer is

currently overallocated, and that base flows from Shepherds Creek are expected to increase, water quality impacts from Shepherds Creek infiltration to groundwater may result in noticeable changes to water quality within the aquifer. If the proposed compliance limits are met, the water should still be suitable for drinking and surface water ecological requirements. Further consideration may be required for irrigation takes.

MWM have proposed active and passive treatment of discharge waters in the Shepherds Creek catchment to ensure that concentrations meet both surface water and groundwater requirements. If this is able to be achieved, there may still be some degradation of water quality as baseline conditions are not known.

## 5 Surface Water Quantity

The main stem of both Rise and Shine Creek and Shepherds Creek have perennial flows and are maintained by spring flow and groundwater baseflows. Comparison of stream flow from stream gauging at SC01 and SC03 and JC01 indicated that most of the flow was sourced from the upper headwaters, however, it is also possible that there are losses to shallow groundwater in the valley alluvium throughout this reach. During the site visit, we observed that flows within the Shepherds Creek valley were variable, indicating losses and gains to groundwater along its reach.

Calculations of flow reductions were completed by MWM in response to changes in catchment areas for the maximum mine extent. However, it should also be noted that due to the permanent diversion of Shepherds Creek, there will no longer be any surface water-groundwater interaction along this stretch of the creek, as the creek will be permanently elevated above the groundwater table. The creek diversion will be designed to minimise losses to groundwater, and will not gain (other than the spring flows in the headwaters). Groundwater contribution to streamflow was not explicitly included in the water balance model, but would have been included indirectly via the calibration of the runoff coefficients and recession coefficients to current conditions.

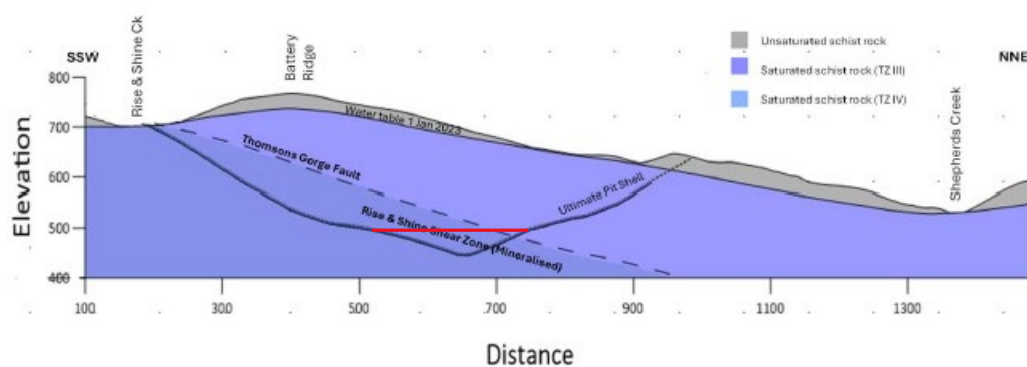
**Table 5: Predicted flow losses due to Mining Operations**

Site	Groundwater	Surface Water (L/s)		
		Mean Flows	Low Flows	Post Mining Mean
SC01	-3.5 L/s + -1.7 L/s (CITpit) + -10L/s RUG	-17%	-27%	+60%
RS03	-2 L/s + -15.3 L/s SRX	-13%	-15%	+50%

These losses may affect the riparian wetlands on Rise and Shine Creek and Shepherds Creek.

## 5.1 Performance monitoring

Monitoring of groundwater levels is proposed around the RAS pit to assess the propagation of the drawdown cone and potential to impact Rise and Shine Creek and associated wetlands. Note that the water table will be permanently changed from the pre-development water table with the RAS pit lake level modelled to stabilise at 490 mASL (red line superimposed on provided figure). It is unclear what level the groundwater table will stabilise to after closure, however it is expected that groundwater gradients, and hence flows will change permanently.



Source: Figure 9, KSL (2026)

## 5.2 Flow Augmentation

Flow augmentation (B.43) is planned within Rise and Shine Creek (Site 2 or Site 3) and Shepherd Creek (Site 1 -upstream of diversion channel), from the commencement of mine operations. The water will be sourced from the Bendigo Aquifer with augmentation flows increasing with the addition of mine operations for RAS Underground, CIT and SRX. The aim of these flows is to replace the stream

water depleted and diverted by pit dewatering, and the change in catchment from mine workings.

## 6 Monitoring

MWM recommend the collection of performance monitoring data to improve model input data reliability is required, including:

- Water quantity and quality data from mine domains and water movement around the site.
- Water quantity and quality data at compliance locations.
- Records of pit lake filling levels over time.

This data should be compared to the developed operational site wide water balance model periodically to confirm model results remain reasonable. Model revisions and/or re-calibration may be required if material differences are apparent.

### 6.1.1 Water Quality Compliance Limits

Groundwater quality compliance limits were derived from NZ drinking water standards and livestock drinking water standards. In many cases, these limits are much higher than the surface water compliance limits, and therefore groundwater should be protected by surface water compliance with the standards, with the exception of arsenic, sulphate, molybdenum and antimony. Given that the main water quality risk to aquifers is from surface water infiltration from Shepherds Creek, and preliminary modelling suggests that minimal dilution will occur within the Ardgour Alluvial Aquifer and Lindis Alluvial Aquifer, the more stringent water quality compliance limit (whether groundwater or surface water) should apply to all compliance points within the Shepherds Creek and Ardgour Alluvial Aquifer. Degradation of water quality within these aquifers has the potential to impact on human health. This was discussed at the Water workshop and agreed as an action point. MGL (2026) reviewed changing these compliance limits in "Water workshop Tasks" document and concluded that having these compliance limits was not achievable due to baseline exceedances at RS03. However, these limits are achievable at SC01 and should therefore being included for Shepherds Creek, which is the focus of water quality concerns for infiltrating groundwater to the Ardgour Aquifer.

At the water workshop, it was confirmed that the irrigation take will remain at the base of Shepherds Creek (Report B.04 had proposed removal of this take). At the

time, the water quality required for the irrigation take was not considered or discussed. Subsequent review of the (ANZECC, 2000) guidelines for irrigation water confirms that the long-term irrigation guidelines (LTV) for several parameters are lower than the proposed compliance limits. Irrigation use of water that meets the proposed compliance limits may cause build-up of contaminants in surface soil over time, and uptake of unacceptable concentrations of the contaminant in the crop, and in the case of short-term limits may cause foliar injury. The parameters of concern are summarised in Table 6. In addition, compliance limits do not currently require any limit for chloride, sodium or electrical conductivity, however, the mine impacted waters are expected to contain high concentrations of these salts (B.06C Appendix M) which may cause soil structure degradation and foliar injury if used on crops. These parameters were not assessed within the WLBM and therefore it is unclear whether or not the concentrations of these will be problematic within waters that meet the currently proposed compliance limits. This has not been discussed with the applicant.

**Table 6: Parameters with lower LTVs for irrigation use than recommended compliance limits**

Parameter	Long-term trigger value (long term use up to 100 yrs) (mg/L)	Short-term trigger values (short-term use up to 20 years) (mg/L)
<b>Boron</b>	0.5	Crop dependent. Grape, cherry considered sensitive: 0.5-1.0
<b>Iron</b>	0.2	10
<b>Manganese</b>	0.2	10
<b>Molybdenum</b>	0.01	0.05
<b>Uranium</b>	0.01	0.1

### 6.1.2 Monitoring Locations

Compliance water quality and flow monitoring would be applied to the Shepherds and Rise and Shine creek catchments at SC-01 and RS-03 monitoring sites, plus groundwater quality monitoring at MW-101 – 103 within the Ardour Aquifer in the post-closure context. Level and water chemistry monitoring of the Bendigo Aquifer supply bore field is also proposed

Additional monitoring locations are required to determine the efficacy of mine waste storage facilities and to understand groundwater dynamics, as well as seepage flow and quality monitoring. Locations for performance monitoring have been provided in G.01 Water Management Plan. HGG (2026) stated a commitment to install monitoring bores screened in both the valley alluvium and weather bedrock where appreciable thicknesses of each are present. At the

Water workshop, there was agreement amongst hydrogeologists that a fence of monitoring wells would be appropriate across the valley at SC01 and possibly also at MW101 and prior to Bendigo Creek flowing out above the Bendigo Aquifer to ensure that any seepage of untreated mine impacted waters would be detected. This was not explicitly described in HGG (2026), but has been described further in Rekker (2026a) and Rekker (2026b) provided 19<sup>th</sup> March, 2026. This described a fence of 5 nested wells across SC01, screened in the weather bedrock and valley alluvium spread across the base of the valley. It was not clear what the distance between wells would be, however assuming a relatively even spread, and location based on the investigations proposed, this fence of wells provides confidence that any substantial migration of seepage water migrating within the Shepherds Creek valley would be detected.

## 7 Management

Throughout the technical reports, many management measures were recommended. However, few of these management measures are incorporated into the consent conditions as clear and enforceable conditions.

### 7.1 Conditions

Conditions were proposed in D.02 and D.04. The conditions are generally light on detail and timeframes and defer to the management plans. Recommended variations to these conditions are presented below. These recommendations do not go into extensive details as it is understood that further opportunity will be provided to firm up both consent conditions and management plans.

The following conditions were offered in MWM (2026):

**Table 7: Conditions offered in MWM (2026)**

Topic	Suggested Condition
<b>Contaminant transport modelling</b>	Prior to the final detailed design of Mine Waste Storage Facilities (MWSF), including the TSF and engineered landforms (ELFs), the Consent Holder must commission contaminant transport modelling studies to support the design of seepage collection elements to achieve appropriate levels of seepage collection to ensure downstream receptors are not adversely affected. The contaminant transport modelling studies must be made available to the Otago Regional Council on request.
<b>Net percolation rates</b>	Within the first year of the Operations Phase (i.e., after 2 years of the BOGP commencing), once sufficient materials have been placed to undertake a trial, the Consent Holder must initiate cover system trials to understand expected net percolation rates within ELFs as part of the BOGP. Details on these trials must be made available to the Otago Regional Council on request. These details will include trial design, trial results, and recommendations informed by the results.
<b>Water Balance Model</b>	Prior to the start of the BOGP Development Phase (i.e., within 6 months of the BOGP commencing), the Consent Holder must commission the development of a site wide transient water balance model to assess effects associated with site water surpluses and deficits against anticipated effects. The site wide transient water balance model must be made available to the Otago Regional Council on request.

**Table 8: D.02 ORC Condition Review**

Condition	Issue	Recommendation
14.3	Water Take from the Bendigo Aquifer - only the maximum instantaneous rate of 110 L/s has been provided, however assessment has only been provided for annual volumes equivalent to an average rate of 100 L/s	<ul style="list-style-type: none"> <li>• Specify maximum annual volume of 3,153,600 m<sup>3</sup>/year.</li> <li>• A shorter term should be specified for this volume of take as it is a very large volume and should not be required at the completion of the operational mine period.</li> <li>• Condition to be added requiring completion of a commissioning pumping test at the proposed maximum pumping rate according to the ORC minimum aquifer test requirements. Observation bores should be installed 20-100 m from the bore to the east and south.</li> <li>• Condition requiring an updated assessment of cumulative drawdown impacts on groundwater users considering results of pumping test and understanding of barrier boundaries</li> <li>• Condition requiring offer of remedial action for any boreowners whose access to groundwater may be affected by the take, such that they have access to their consented volume of water which of equal or better quality.</li> </ul>
15.3e(iii)	Specifies groundwater level monitoring, but no locations or measurement frequency, or triggers.	Specify locations, monitoring frequency and trigger actions responses.

The discharge of waste rock into ELFs and tailings into the TSF are only conditioned to comply with the required water management plan.

**Table 9: D.03 Schedule One Condition Review**

Condition	Issue	Recommendation
C12	Annual reporting	Should require progress on additional testing and modelling recommended within technical reports, such as <ul style="list-style-type: none"> <li>• Updated water balance modelling (source terms &amp; quantities)</li> <li>• Groundwater contaminant transport</li> <li>• Net Percolation testing</li> <li>• Water quality treatment capabilities</li> <li>• Oxygen ingress achievement</li> </ul>

**Table 10: D.04 Schedule Two Condition Review**

Condition	Issue	Recommendation
10 & 11	The requirement for the WMP is very light on details and actual requirements.	Specify more of the requirements for WMP, timelines for actions, for review and for certification of review.
12/14	The main water quality risk to aquifers is from surface water infiltration from Shepherds Creek, and preliminary modelling suggests that minimal dilution will occur within the Ardgour Alluvial Aquifer and Lindis Alluvial Aquifer, which provides base flow to the Lindis River. Degradation of water quality within these aquifers has the potential to impact on human health and Lindis River water quality.	The more stringent water quality compliance limit (whether groundwater or surface water) should apply to all compliance points within the Shepherds Creek and Ardgour Alluvial Aquifer. Further consideration needs to be made regarding irrigation water quality (sodium, chloride, EC).
15	The groundwater compliance locations do not contain any detail regarding target lithologies Performance monitoring locations are important for understanding impacts	Groundwater compliance locations should specify target lithologies Performance monitoring should be specified more explicitly.

## 7.2 Water Management Plan (G.01)

The water management plan contains good recommendations regarding performance monitoring parameters and locations. Whilst there are recommendations for controlling risks, there is no timeframe for implementing these controls. Whilst there is a requirement to develop action response plans, there is no timeframe or commitment to specific plans – it only says they ‘may include a response’ to certain events. This provides little certainty, and there is no requirement to report on these or to provide them to the council.

The technical reports contained much stronger recommendations for management than the management plan itself, e.g. B.06 states “A *site water balance reconciliation should be completed regularly (e.g., annually or more frequent) to confirm water balance model results are appropriate, and/or make model updates to improve confidence in model results projected into the future*”, whereas the WMP only states, “*Ongoing site water balance reconciliation for the BOGP will be required to confirm water balance conditions remain in a water deficit condition*”. Indeed, B.06 states that the following water treatment studies “should be considered in framing consent conditions”

“Further studies should be undertaken within the first few years of operations to...

- ...confirm the WTP requirements and the treatment efficiencies...  
...should include bench-scale trials to validate study assumptions; site-based pilot trials as a part of the pre-feasibility study for water treatment; and operational trials as part of the feasibility study for water treatment”.
- ...determine the quantity and quality of water treatment residues (sludge) and identify appropriate disposal locations.

I agree with the recommendations of the technical reports that these should be expressly included within the management plans and conditions.

## 7.3 ELF Management Plan

This management plan has not been reviewed in detail. The need for water quality monitoring and review is directed to the WMP. Whilst the risk management controls specifies the need to achieve a net percolation rate of 20% mean annual

rainfall and the need to complete trials, there is no timeframe or reporting required for this. The need to complete the trials, and subsequent updated water balance load modelling and water treatment plant requirements should be included in conditions.

## 8 Key Issues

The assessments of effects have been completed for operational, active mine closure and post closure conditions, until the mine impacted waters are assumed to be able to be treated by passive treatment methods. Achieving water quality compliance limits is reliant on capture and treatment of mine impacted waters prior to discharge.

Adaptive management relies on being prepared with a clear suite of options to manage and treat water. Water balance modelling to date relies on average rainfall and evaporation data and further collection of both water quality and flow volumes and additional transient modelling is recommended by the applicants experts.

The Water Management Plan lacks timeframes for implementation or certainty around adaptive management responses.

### 8.1 Areas of Agreement

Groundwater take impacts from the Bendigo Aquifer can be further assessed after a commissioning test, with conditions requiring management of impacts. The likelihood of significant impacts on allocation are low.

The geological and topographical setting of the Shepherds ELF and TSF in conjunction with the seepage collection and management proposed are conducive to maximising capture of seepage. If the groundwater monitoring fences discussed at the Water workshop are implemented, the likelihood of uncaptured seepage escaping detection is low. Should contaminants be detected, there are options available to detain and treat contaminated groundwater within the valley.

## 8.2 Areas of Disagreement

The conditions and management plans offered to date do not provide adequate confidence that monitoring will be effective and enforceable, nor that all of the additional monitoring and testing required to ensure compliance will be fulfilled. The conditions and plans lack clear timeframes for actions and do not clearly require reporting on the management measures to be tested that are vital for water quality management such as updated water balance modelling, field testing of net percolation rates, testing of oxygen ingress into ELFs, and water treatment options.

## 8.3 Uncertainty of Effects

The uncertainty of effects is tied to the ultimate quantity and quality of water that will require treatment, and whether in fact that water can be treated such that that compliance limits can be met at the compliance locations.

The water quality balance modelling relies on:

- 20% net percolation into the engineered landforms and tailings storage facilities, although the net percolation assessment suggests that final landforms may have net percolation of 30-50% of the annual precipitation. If the percolation rate is higher, the water quality impacts will be greater.
- There being a water deficit across the mine site. If there is a water surplus across the site, discharges may occur in advance of water treatment being available. Calculations have been completed based on annual average rainfall and evaporation. Uncertainty analysis should be completed to determine the effects of higher net percolation and higher rainfall in conjunction with lower evaporation. KSL recommended assuming a safety factor of 2 for peak groundwater dewatering flows which was not incorporated into the operational water balance modelling.
- All seepage of mine impacted waters being captured for treatment.
- Water treatment achieving the proposed design standards.

The ability to treat the water to achieve compliance limits relies on there being adequate time between operations commencing and mine water surplus occurring to test treatment options and efficacy. Without further uncertainty analysis or modelling, it is not clear this can be achieved. The applicant maintains

that water surpluses prior to water treatment being operational can be managed adaptively to prevent discharges.

The applicant's technical reports propose that this uncertainty be addressed by updates to water balance models as real data (flows and quality) from mine operation is collected, and water treatment trials confirm that water quality can be achieved. In addition, a transient water balance model and groundwater contaminant model are proposed.

There also remains uncertainty regarding the impact of permanent groundwater level change caused by the RAS Pit on the surrounding groundwater table, and hence subsequent groundwater flow directions.

Since the water workshop, I have identified that effects on irrigation water quality have not been assessed.

#### 8.4 Resolution of Issues Raised To Date

Responses to my initial further information requests, and any additional information required are summarised in the following table.

Issue	Doc	Information Required	Reason	Response	Remaining Issue
Information Gap	B.02	The pumping test should be completed for at least 72 hours at the maximum pumping rate	Extended pumping at the maximum rate is required to determine the impact of the aquifer boundaries and anisotropy on the drawdown extending from the pumping well. Impacts on neighbouring wells may be greater than anticipated.	Rekker (2026) has stated the applicants intent to conduct a commissioning aquifer test that would provide better information to complete a cumulative drawdown assessment. If the drawdown assessment indicated that groundwater users would be affected by drawdown induced by MGL's proposed take, MGL would offer remedial actions to the affected bore owner to minimise, offset or compensate for any reduced access to groundwater. It is proposed that this would be included in the Water Management Plan.	Conditions need to be written that specify the need to assess cumulative drawdown and provide alternative supply if required. This is better managed in conditions than in the WMP.
Clarification	B.05	Each of the models underestimates head in vicinity of pit, and overestimates in areas of discharge. Given the creeks are modelled as a constant head boundary, what is the effect of this on anticipated groundwater drawdown and stream depletion?	Stream depletion effects may be underestimated.	Modelling indicates that there will be no direct depletion from Shepherds Creek from groundwater drawdown, only reduced flows due to a reduced catchment. In the RAS catchment, stream depletion estimates are likely conservative as the median flows are less than the projected stream depletion due to SRX Pit dewatering. Stream depletion will be addressed by flow augmentation	
Information Gap	B.05	Stream depletion effect of RAS underground workings	Stream depletion may be underestimated	Stream depletion will not occur as there is 250 m rock above RAS below the stream base. Additional modelling indicated that at most the depletion would be 0.01 L/s.  In addition, Shepherds Creek will no longer be in connection with groundwater as the permanent diversion channel will be elevated above the valley floor on fill.	

Information Gap	B.05	Groundwater contaminant modelling	<p>Contaminants will move slowly through groundwater and provide baseflow to streams. Reports assume that all seepage will be captured, however this is not likely based on groundwater contaminant plumes from Macraes which is considered to be an analogue site.</p>	<p>MWM response indicates &gt;80% seepage capture achievable. Shallow depth to bedrock (&lt;5 m) below Shepherds ELF and TSF, however deeper downgradient of site. No investigations in downstream Rise and Shine near Western ELF. Current groundwater data indicates discharge to streams (upwards vertical gradients). Contaminant transport modelling will be completed to support detailed design of these seepage collection systems to achieve appropriate levels of seepage collection. The following consent condition is proposed to address this further information request: "Prior to the final detailed design of Mine Waste Storage Facilities (MWSF), including the TSF and engineered landforms (ELFs), the Consent Holder must commission contaminant transport modelling studies to support the design of seepage collection elements to achieve appropriate levels of seepage collection to ensure downstream receptors are not adversely affected. The contaminant transport modelling studies must be made available to the Otago Regional Council on request." Information provided in response to RFI #6 regarding effects on the Ardgour Aquifer and Lindis is not well supported and contrary to Dumont and Rekker, (2025). Discussion around seepage collections systems and the installation of groundwater monitoring fences and performance monitoring within the valleys at the Water Workshop provides greater confidence that seepage collection systems have appropriate detection and management contingencies in place to protect water quality.</p>	<p>Confirmation of incorporation of proposed consent condition</p>
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<b>Information Gap</b>	B.06-I	<p>Uncertainty analysis on the effect of lower concentrations of iron within the surficial MIW source term.</p>	<p>The source term for surficial mine impacted water quality was sourced from 95th percentile Frasers Pit sump wall water quality prior to 2011, which was then allowed to equilibrate using PHREEQC geochemical model which indicated precipitation of arsenic, copper, aluminium, iron and lead would greatly decrease the concentrations of these parameters. This relies on there being high concentrations of iron, which was not indicated in the groundwater quality monitoring within the pit locations. In addition, given the high quantities of arsenic indicated within soils, the risk of mobilising higher arsenic loads is not insignificant.</p>	<p>Iron sourced from high wall runoff, not groundwater. Refers to Arsenic Soil Management Plan</p>	<p>Arsenic soil management plan (G20) indicates assessment has only been made of pit areas and that additional assessment is required. Significant areas of soil disturbance and movement will be made outside of these areas for roading. Requires separate As- and Cd- bearing soils will be identified and kept separate from non As- and Cd-bearing topsoil during reclaim, storage, and placement. Maps of topsoil stockpiles need to specify which stockpiles are which, and separate sediment ponds are required. This was discussed at Water workshop. Timeframes for further delineation and update of management plan required. Performance monitoring of these ponds will be required to ensure that discharge water quality is managed via settlement.</p>
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Issue	Doc	Information Required	Reason	Response	Remaining Issue
Information Gap	B.06-K/L/ N	Uncertainty analysis of the effect of higher net percolation rates on ELF seepage water quality during active mine water management	The modelling uses a net percolation rate of 20% which at the lower end of the values predicted in the net percolation report (Appendix K). This is very significant as it has the largest effect on contaminant mobilisation. The net percolation rate will have the greatest effect on solute load, and hence effects on water quality.	Within the first year of the Operations Phase (i.e., after 2 years of the BOGP commencing), once sufficient materials have been placed to undertake a trial, the Consent Holder must initiate cover system trials to understand expected net percolation rates within ELFs as part of the BOGP. Details on these trials must be made available to the Otago Regional Council on request. These details will include trial design, trial results, and recommendations informed by the results.	Confirmation of incorporation into consent conditions. Results should be incorporated into annual report, rather than made available on request. Results must be incorporated into annual updates of WBLM to inform WTP design
Clarification	B.06C-N	Confirmation of whether internal MIW has or hasn't been used within the operational mine water balance i.e. has this water been used for dust suppression to reach the conclusion of a water deficit during the operations phase	The water quality load balance assessment relies on only bore water being used for dust suppression. If the internal MIW has been used for dust suppression, the water balance model should be re run for the assumed condition of using bore water for dust suppression.	Not used within water balance.	Need performance limits above which pit water cannot be used for dust suppression. Possible condition of consent or at least clear trigger in WMP.

Issue	Doc	Information Required	Reason	Response	Remaining Issue
Information Gap	B.06C-N	Additional transient water balance modelling to account for greater values of groundwater dewatering (KSL suggested increasing peak dewatering rates by a safety factor of 2), and modelling with a range of rainfall and evaporation values.	The site needs to be maintained in a water balance deficit to allow for time to test net percolation rates and treatment train efficacy if water quality compliance limits are to be met. Further analysis should be completed to determine the risk of water surpluses. This is recommended within the MWM reports " <i>detailed water balance modelling by mine stage and that includes rainfall variability is recommended to support detailed mine design and improve confidence in a water deficit being maintained;</i> " and " <i>A transient operational site wide water and load balance model needs to be developed prior to mine commencing to improve confidence in water accumulation or losses over time and water quality, particularly for seasonal dynamics.</i> "	Prior to the start of the BOGP Development Phase (i.e., within 6 months of the BOGP commencing), the Consent Holder must commission the development of a site wide transient water balance model to assess effects associated with site water surpluses and deficits against anticipated effects. The site wide transient water balance model must be made available to the Otago Regional Council on request.	Confirmation of incorporation into consent conditions

Issue	Doc	Information Required	Reason	Response	Remaining Issue
Information Gap	B.06C-N	Additional ground investigations, groundwater monitoring in the vicinity of planned mine waste storage facilities	Required to confirm mine waste storage facility seepage collection systems will achieve anticipated collection requirements.	Directed to information contained in G.01 Water Management Plan and B21 & B22 EGL reports.	How are the monitoring bores to be constructed and targeted within the shallow alluvium? Some deeper bores should be constructed into bedrock to identify and deeper contaminant pathways from pit lakes & WRS. Some of this detail has been provided in HGG (2026), and Rekker (2026a) with respect to a monitoring fence at SC01.
Information Gap	B.06C-N	Comparison of the pit lake discharge volumes with the expected contribution from the RAS underground workings	The discharge from the RAS Pit through the RAS underground mine workings is assumed to be adequately represented by the calculated RAS Pit Lake and that the volume of the RAS underground workings do not impact on the overall volume –	Relative volumes not provided. States that pit backfill will have much lower permeability than robbed crown pillar, however elsewhere it is stated that the permeability of tailings paste will be the same as the native rock, which is still expected to make water. Comparison with Macraes assumes same relative volumes.	Still to be confirmed

Issue	Doc	Information Required	Reason	Response	Remaining Issue
Information Gap	B.06C-N	Assessment of the effect of discharge of tailings paste into the underground workings on water quality	Water quality discharging from the RAS pit lake through the RAS underground workings may be different to the pit water quality.	Assumes no influence due to dominance of pit lake. Provision of MEND (2006). Paste Backfill Geochemistry – Environmental Effects of Leaching and Weathering. MEND Report 10.2. This report states that “the lack of detailed information currently available is of concern and highlights the need to compile detailed site data and monitoring data for future assessment and validation of predictions currently being initiated.”, and concludes that “Most studies and/or recent discussions emphasize that it is critical to consider the contaminant producing potential of the specific paste backfill being used in the long-term, under the site-specific operational storage conditions and proposed closure”, and “In summary, the use of paste backfill in underground environments has generally been considered beneficial to reduce overall environmental impacts associated with mining. The general theories associated with paste backfill characteristics and geochemical reactivity appear sound, but there does not appear to be much field validation of actual influence of key parameters”	MEND (2006) suggests instrumentation and monitoring of placed paste backfill over an extended period of time to understand stope water quality evolution, assessment of pore water quality evolution within the backfill mass and monitoring of chemical and physical behaviour of backfill under operational conditions. This monitoring would assist in understanding the possible issues

Issue	Doc	Information Required	Reason	Response	Remaining Issue
Clarification	B.04/ B.06-N	Clarification of how the RAS pit will be connected to the underground portal and how this will ultimately discharge.	Outflow from RAS pit through the mine underground workings is modelled using groundwater flow equations – it is unclear whether this actually makes sense of how this portal will operate and the final connection between the underground workings and the RAS Pit Lake. There is also variation in the portal elevation between the KSL and MWM reports, which may also explain the contradiction in Pit Lake filling and discharge times (documented as 50 years and 25 years respectively). It is not clear how this discharge will operate or connect to Shepherds Creek.	Clarifies connection between pit lake and underground workings, but not how the discharge will connect to Shepherds Creek.	This was discussed as a small stream at the Water workshop, however it is also to be captured and treated prior to discharge. Further clarity would be helpful as to the long-term plan for this new flow.
Information Gap	B.03	Dumont, M., & Rekker, J. (2025). Post Closure Impacts of Bendigo Ophir Gold Deposit on the Ardgour Aquifer (Client Report for Matakanui Gold Ltd Z24002.2; p.50). Kōmanawa Solutions Ltd.	Referenced as the source of information for predicting the effects on the Ardgour Aquifer summarised in B.03 - Kōmanawa Solutions Limited - Groundwater Existing Environment and Effects Assessment (Kōmanawa 2025b).pdf. However, this report has not been provided. Without the full report I cannot determine whether the modelling appropriate nor understand the limitations and assumptions,	Report now provided.	Modelling completed indicates that Shepherds Creek water infiltrating to the Ardgour Aquifer, then Lindis Alluvial Aquifer and Lindis River may not be significantly diluted, and therefore compliance limits should be protect drinking water quality and ecological health.

Issue	Doc	Information Required	Reason	Response	Remaining Issue
Information Gap	B12/ B.42/ B43	Hydrological understanding of wetlands, including uncertainty analysis based on unknown storage values or the assessment of wetland hydrology (catchment and flows), and the effects of increased flows on the wetland.	The radius of drawdown is very sensitive to the storage value used. The impacts on wetlands were assessed based on the drawdown disturbance footprint. No assessment has been completed regarding the effects of long term higher flows on the wetlands.	Further investigations into wetland hydrology are proposed, see Report B.42 and B.44 (HGG, 2025a) and the Water Management Plan (MGL, 2025a). Investigations will include review of creek flow data, creek water levels, and installation of drive point piezometers to understand wetland groundwater-surface water interactions Confirmed wetlands on northern side of Shepherds Valley will be monitored photographically in MGL (2026) "Water workshop tasks"	